

**CLAIMS**

- 1           A self-powered floating water-skimming vessel for use in collecting debris on or just below the surface of water, the vessel having a waterline and comprising:
- 5           two axially-aligned laterally-spaced hulls,  
          propulsion means to drive the vessel in either axial direction,  
          a debris catcher arranged between the said hulls, at least portion of said catcher being arranged below the waterline, and said catcher having first and second lateral end openings into which debris can enter and exit  
10          depending upon whether the respective opening is leading or trailing having reference to movement of the vessel,  
          a first flap hinged to close the first opening of the catcher, when said first opening is the trailing opening so as to block the egress of debris from the catcher, and to open when said first opening is the leading opening to  
15          permit ingress of debris into the catcher,  
          a second flap hinged to close the second opening of the catcher, when said second opening is the trailing opening to thereby block the egress of debris from the catcher, and to open when said second opening is the leading opening to thereby permit ingress of debris into the catcher.
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- 2           A vessel according to claim 1 having a third flap hingedly-mounted and laterally-arranged between said first and second flaps, such that floating debris admitted into the catcher tends to be submerged and wetted as it moves toward the trailing opening.
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- 3           A vessel according to claim 1 or 2 wherein the propulsion means includes a reversible propulsion unit arranged in each hull so that the vessel can be driven in one axial direction or the other when said units are operated in together and to turn the vessel when said units are operated  
30          differentially.
- 4           A vessel according to claim 3 wherein:  
          each propulsion unit is electrically driven,

electric batteries are connected to and capable of driving the propulsion units, and

solar cells are arranged on the vessel and connected to charge the batteries and/or drive the propulsion units.

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5 A vessel according to claim 3 or 4 wherein:

each propulsion unit comprises an electric motor located within the respective hull,

a propeller mounted outside the respective hull and

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magnetic coupling means for transmitting driving torque from the motor to the propeller through the hull.

6 A vessel according to any preceding claim wherein;

sensor means is mounted on or in each end of each hull for

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detecting contact between the respective hull and an obstacle ahead of the vessel's direction of travel,

control means is provided to connect said sensor means to said propulsion means to effect reversal and/or turning of the vessel upon detection of said contact.

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7 A vessel according to claim 6 wherein the sensor means comprises:

a moveable magnet arranged on the outside of the hull and adapted to be displaced with respect to the hull upon contact with an object, and

a magnetically operable electrical switch mounted within the hull

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adjacent said magnet for operation by the movement of the magnet.

8 A vessel according to claim 6 or 7 wherein said sensor means is located on or below the waterline on the end of the respective hull.

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9 A vessel according to claim 6, 7 or 8 wherein said control means causes the vessel to cover substantially the whole surface of a rectangular swimming pool over a period of time.

10           A vessel according to any one of claims 6 to 9 wherein said control means effects the reversal of the propulsion unit in one hull for a predetermined time when the sensor means at either end of said hull detects contact with an object.

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11           A vessel according to any preceding claim wherein at least portion of the catcher or said flaps is formed from or coated with hydrophobic and/or oleophilic material to facilitate the collection of floating oil on the surface of the water within the catcher.

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12           A water skimming system for use with a swimming pool having a peripheral wall that extends upwards above the level of pool water including:

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          a water skimming vessel as claimed in any preceding claim,  
          docking means provide for mounting on the wall of the swimming pool so as to extend below the level of the pool water, and

          homing means in the vessel adapted to direct the vessel into said docking means to effect emptying of the catcher or recharging of batteries in the vessel.

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13           A water skimming system according to claim 12 for use with a swimming pool having a skimmer box or like water outlet formed in the wall of the pool and wherein said docking means is adapted for mounting in front of the water outlet so that pool water leaving the pool is directed to flow through the docking means, whereby water leaving the pool will flow through the catcher of a vessel located in the docking means to effect the emptying of debris from the catcher into the water outlet.

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14           A water skimming system according to claim 13 wherein the vessel or the dock includes flap release means to release the leading flap of the catcher so that it can swing outwardly of the catcher to facilitate flow of debris from the catcher of a docked vessel .

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15           A system according to claim 13 or 14 wherein the docking means includes:

                  power supply means for effecting the charging of batteries on a vessel docked therein, and

5                a homing beacon detectable by the homing means on the vessel, said homing means being connected to the control unit for directing the vessel to the docking means.

16           A system according to claim 15 wherein:

10               the homing beacon comprises a directional radiation emitter,

                  the homing means comprises a directional radiation detector adapted to selectively detect the radiation emitted by the emitter, and

                  the docking means or the homing means includes light sensitive switch means adapted to disable the homing function in ambient sunshine  
15               sufficient to charge the batteries of the vessel from the solar power unit.

17           A system according to claim 16 wherein:

                  the homing means comprises a directional radiation emitter and detector,

20               the homing beacon comprises a directional radiation reflector, and

                  the homing means includes light sensitive switch means adapted to disable the homing function in ambient sunshine sufficient to charge the batteries of the vessel from the solar power unit.

25           18           A water skimming system according to any one of claims 12 to 17, wherein:

                  the docking means includes latching means for holding the vessel in the dock to permit discharge of debris from the catcher or recharging of the batteries in the vessel.

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19           A water skimming system according to any one of claims 12 to 18 wherein:

                  the docking means includes a power transmitter connected to the power supply, and

the vessel includes a power receiver connected to charge the batteries of the vessel,  
power transmission is initiated upon latching of the vessel in the dock.

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20 A method of removing floating debris from a swimming pool having a peripheral wall containing an outlet opening at the level of water in the pool, the method comprising the steps of:

operating in the pool a self-powered floating skimmer vessel having  
10 a catcher for collecting debris,

causing the vessel to dock with docking means arranged in front of the outlet opening, and

discharging collected debris from the catcher into pool water flowing into the outlet while the vessel is docked.

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21 A method according to claim 20 wherein the vessel is powered by solar cells and batteries and the debris catcher has front and rear flaps, the method comprising the steps of:

propelling the vessel over the surface of the pool water with the front  
20 flap open to permit debris to enter the catcher, and with the rear flap closed to inhibit debris from leaving the catcher,

permitting or causing the front and rear flaps to open when the vessel is docked so that the pool water flowing into the outlet carries debris out of the catcher and into the pool outlet, and

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charging the batteries in the vessel while it is docked.